DRAFT

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

February 25, 2019

KA Project No. 022-19002

Mr. Larry Trowsdale
PVL Lime
82532 2nd Street
Trona, California 93562

Re: Update to Geotechnical Engineering Investigation Report
Proposed Lime Plant (Cell 3)
Athol Street and Roberts Road
Trona, California

Dear Mr. Trowsdale:

In accordance with your request, we are providing this Update to the Geotechnical Engineering Investigation Report for the proposed Lime Plant to be located at the previous Ace Ash Landfill in Trona, California. This update incorporates Cell 3 which was previously excluded. A Geotechnical Engineering Investigation was previously completed for the site by Krazan & Associates, Inc. (KA Project No. 022-18063) dated August 14, 2018.

We understand that design of the proposed development is currently underway; structural load information and other final details pertaining to the structures are unavailable. The project involves the design and construction of a new lime plant to be located within a previous ash landfill. It is understood the buildings will be single- or two-story structures. Equipment including bins, conveyors, etc. will be associated with the development. It is anticipated the structures and equipment will be supported on conventional foundations, mat foundations or drilled piers. Foundation loads are anticipated to be light to moderate.

The site is irregular in shape and encompasses approximately 57 acres. The site is located on the southwest corner of Athol Street and Roberts Road in Trona, California. Cell 3 is located in the northeast portion of the site. An existing industrial development is located south of the site. Vacant land is located east of the site. Vacant land including rolling hills is located north of the site. A fly ash processing facility is located to the west. Railroad tracks are located along the eastern boundary.

Presently, the site is predominately vacant. Scattered piles of ash are located within the site. The site previously consisted of excavated basins that were backfilled with fly ash. Due to the various stages of backfill, the site has an uneven topography. The site is covered with a sparse weed growth and the surface soils have a loose consistency.

Five borings were recently advanced to depths of approximately 15 to 55 feet below existing site grade within Cell 3 and in the area planned for the on-site leach field.

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the upper soils consisted of approximately 6 to 12 inches of very loose silty sand, gravelly silty sand or fly ash slurry fill. These soils are disturbed, have low strength characteristics and are highly compressible.

Below the upper soils, in some of the borings, approximately 1 to 22½ feet of granular fill material was encountered. The fill material predominately consisted of silty sand and gravelly silty sand. The deep fill (22½ feet) was encountered in the northwest portion of Cell 3 which was in an elevated portion of the site. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soils during the time of our field and laboratory investigation. The limited testing indicates the fill soils had varying strength characteristics ranging from loosely placed to compacted.

Below the loose surface soils and/or granular fill soils, approximately 8½ to 51 feet of fly ash or fly ash slurry was encountered. This material had varying strength characteristics. Penetration resistance ranged from 3 blows per foot to over 50 blows per 6 inches. Dry densities ranged from 32 to 117 pcf. Representative soil samples consolidated approximately ½ to 3½ percent under a 2 ksf load when saturated. Representative soil samples had angles of internal friction of 37 to 53 degrees. Within the area of the percolation tests, which was outside of the previously backfilled ponds, the loose surface soils were underlain by loose to medium dense gravelly silty sand.

Below 10 to 51 feet, predominately medium dense to very dense silty sand or gravelly silty sand were encountered. Some of these soils were intermixed with cobbles. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 13 blows per foot to over 50 blows per 6 inches. Dry densities ranged from 72 to 120 pcf. These soils extended to the termination depth of our borings.

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

For additional information about the soils encountered, please refer to the logs of borings attached.

PERCOLATION TESTING

Two supplemental percolation tests were performed within the site to evaluate the soil absorption characteristics. One of the previous tests was within the fly ash backfill which resulted in a very low test result. These tests were located outside of the previous backfill and to the east of Cell No. 1. The percolation tests were performed in the areas adjacent to the backfilled basins. The percolation tests were performed at depths of approximately 4 to 8 feet below the existing ground surface. The tests were conducted in general accordance with the criteria set in the "Manual of Septic Tank Practice" published by the Department of Health, Education, and Welfare. Results of the tests are as follows:

Test No.	Depth (feet)	Percolation Rate (min/in)	Soil Classification
P1A	4	30	Gravelly Silty Sand (SM)
P2A	8	15	Gravelly Silty Sand (SM)

The test results indicate that the soils tested at approximately 4 to 8 feet have moderate absorption characteristics. The test results do not include a factor of safety. The percolation rates given are based on 1 inch of fall within an 8-inch diameter hole with a 6-inch head of water. The drainage rate does not include a factor of safety.

After visual inspection of the project site and additional field testing, it is our opinion that the recommendations provided in the previous Updated Geotechnical Engineering Investigation Report dated August 14, 2018, are still valid for the currently proposed site with the noted modifications. The site preparation is summarized as follows:

> General site clearing should include removal of vegetation; concrete and metal debris; existing utilities; structures including foundations; basement walls and floors; existing stockpiled soil; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.
>
> Approximately 1 to 22½ feet of granular fill material was encountered within the borings drilled at the site. The deep granular fill was encountered in the northwest portion of Cell No. 3 which was an elevated portion of the site. In addition, stockpiles of fill are located within the site. The granular fill overlays the fly ash and fly ash slurry. The fill material predominately consisted of silty sand and gravelly silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Verification of the extent of fill should be determined during site grading. Limited testing was performed on the fill soils during the time of our field and laboratory investigations. The limited testing indicates the fill soils had varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended that the fill soils in the areas of conventional shallow or mat foundations be excavated and stockpiled so that the subgrade soils can be prepared properly. Limits of removal and recompaction should extend 5 feet beyond structural elements. These soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics and debris. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional excavation will be required.

Existing structures are located within the project site vicinity. Associated with these developments are buried structures such as utility lines that may extend into the project site. Demolition activities should include proper removal of any buried structures. Any buried structures, including utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. Disturbed areas caused by demolition activities should be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Soils Engineer. Any other buried structures should be removed in accordance with the recommendations of the Soils Engineer. The resulting excavations should be cleaned to firm subgrade and backfilled with Engineered Fill.

In order to provide uniform foundation support, it is recommended that following stripping, fill removal operations, and demolition activities, the upper 24 inches of soils within the area of structures to be supported on shallow conventional or mat foundations be excavated, worked until uniform and free from large clods, moisture-conditioned as necessary, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. In addition, it is recommended that the proposed conventional or mat foundations be supported by a minimum of 24 inches of Engineered Fill. Excavation should extend to a minimum of 5 feet beyond structural elements. The on-site soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Following stripping, granular fill removal, and demolition activities, the exposed subgrade within the exterior flatwork and pavement areas should be excavated/scarified to a depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned as necessary, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Limits of recompaction should extend a minimum of 2 feet beyond flatwork and pavements. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

As indicated previously, fill material is located on the site. It is recommended that any uncertified fill material encountered within pavement areas be removed and/or recompacted. The fill material should be moisture-conditioned to near optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the existing fill within paved areas. However, the Owner should be aware that the paved areas may settle, which may require annual maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soil be moisture-conditioned as necessary and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Slopes can be constructed/reconstructed by placement of Engineered Fill utilizing a keying and benching procedure as described below. Reconstructed slopes should be constructed at an inclination not exceeding 2:1 (horizontal to vertical) slopes or flatter. Krazan and Associates, Inc. should be retained to review all slope reconstruction plans and specifications prior to initiating the repair work.

Temporary construction slopes, in the natural soil, should be constructed in accordance with Occupational Safety and Health Administration (OSHA) standards. However, in all cases, appropriate safety precautions should be provided. Construction dewatering is not expected to present problems during late summer or early fall. During these months, subsurface flow will be minimal. Although unlikely, if water is encountered it may be handled either singularly or with a combination of discing, diverting, and pumping. This office will be in a position to assist the Contractor in designing dewatering systems if the conditions at the time of construction warrant it.

General site clearing should include removal of vegetation, any loose and/or saturated materials. Excavations or depressions extending below subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill, placed and recompacted in accordance with the recommendations stated herein.

Where fills greater than 8 feet are to be constructed on original ground that slopes at inclinations steeper than 6:1 (horizontal to vertical), benches should be cut into the existing slope as the filling operations proceed. Each bench should consist of a level terrace a minimum of 10 feet wide, with the rise to the next bench held to 4 feet or less. Where fills of comparable height will be constructed on ground that slopes at an inclination steeper than 4:1 (horizontal to vertical), a keyway should be provided in addition to the benches. Each keyway should consist of a level trench at least 10 feet wide and at least 2 feet deep, with side slopes not exceeding 1:1 (horizontal to vertical), cut into the existing slope. Where fills of comparable height will be constructed on ground that slopes at an inclination steeper than 2:1 (horizontal to vertical), geotextile fabric and retaining structures should be utilized in slope construction where subsequent specific building site investigations warrant.

Permanent cut-and-fill slopes inclined at 2:1 (horizontal to vertical) should be grossly stable. If static surcharge loading is located within a horizontal distance from the brow of the slope, equal to ⅓ the slope height (H/3) or 30 feet, whichever is less, a stability analysis should be performed. Fill slopes should be constructed by over-tilling and trimming back to provide a firm, well-compacted slope face.

The upper soils, during wet winter months, become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Soils Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Seismic Parameters – 2016 California Building Code

The Site Class per Section 1613 of the 2016 California Building Code (2016 CBC) and Table 20.3-1 of ASCE 7-10 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2016 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.3.2
Site Coefficient F_a	1.008	Table 1613.3.3 (1)
S_s	1.229	Section 1613.3.1
S_{MS}	1.240	Section 1613.3.3
S_{DS}	0.826	Section 1613.3.4
Site Coefficient F_v	1.589	Table 1613.3.3 (2)
S_1	0.411	Section 1613.3.1
S_{M1}	0.653	Section 1613.3.3
S_{D1}	0.436	Section 1613.3.4

Limitations

Soils Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed using the most appropriate and most current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Soils Engineering, physical changes in the site, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during the field investigation. If any variations or undesirable conditions are encountered during construction, the Soils Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The Soils Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

This report is a Geotechnical Engineering Investigation Update with the purpose of evaluating the soil conditions in terms of building foundation design and related site preparation. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere, or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

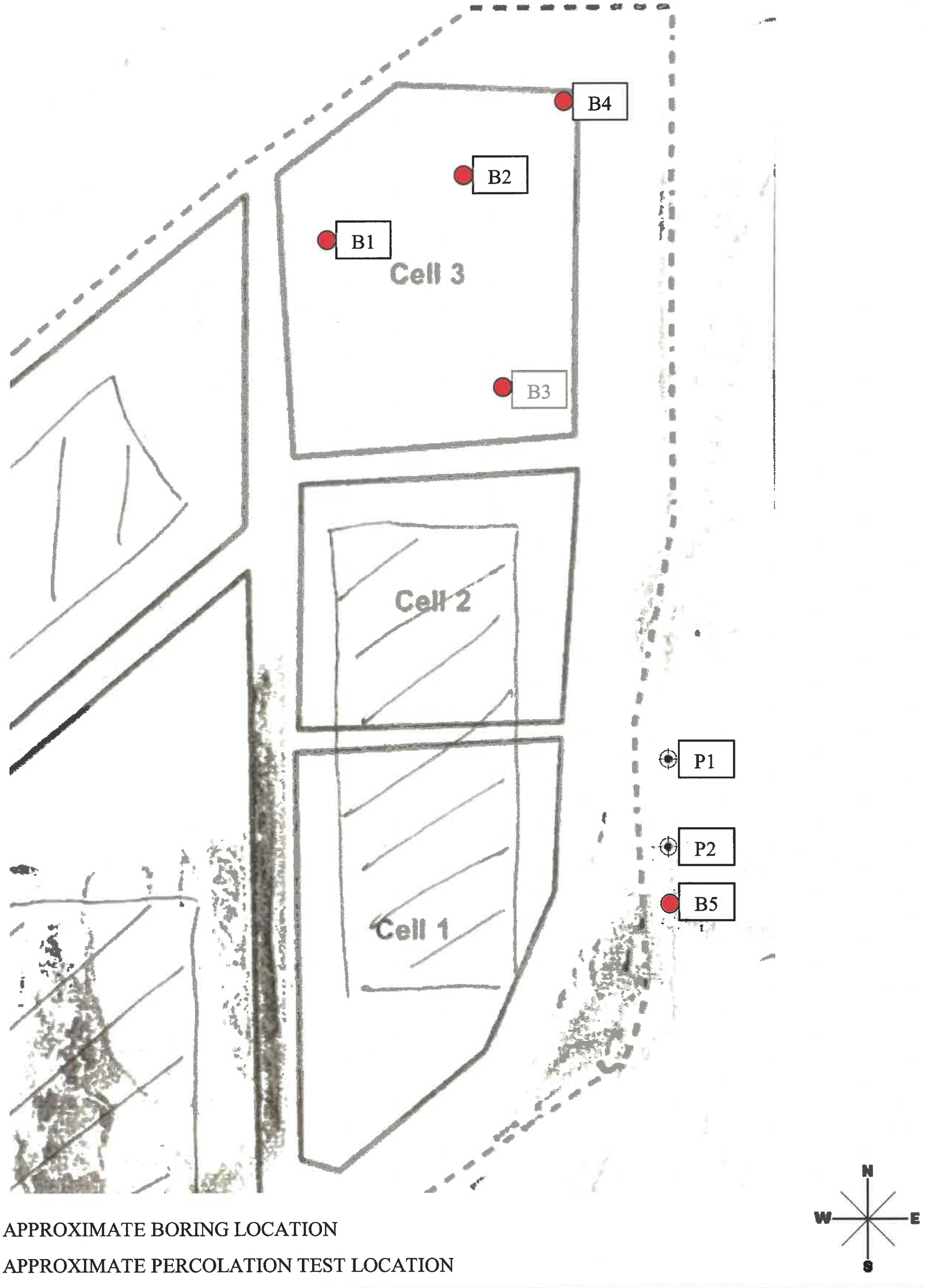
The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

The recommendations and limitations provided in the Updated Geotechnical Engineering Investigation Report dated August 14, 2018, which were not revised or superseded herein, will apply to this letter. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (661) 837-9200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

DRJ:ht



● APPROXIMATE BORING LOCATION

◉ APPROXIMATE PERCOLATION TEST LOCATION

SITE MAP	Scale: NTS	Date: Feb. 2019	Krazan GEOTECHNICAL ENGINEERING
Lime Plant **Ace Ash Landfill** **Trona, California**	Drawn by: HT	Approved by: DJ	
	Project No. 022-19002	Figure No. 1	

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
	Clean Gravels (Less than 5% fines)	
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
	Clean Sands (Less than 5% fines)	
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

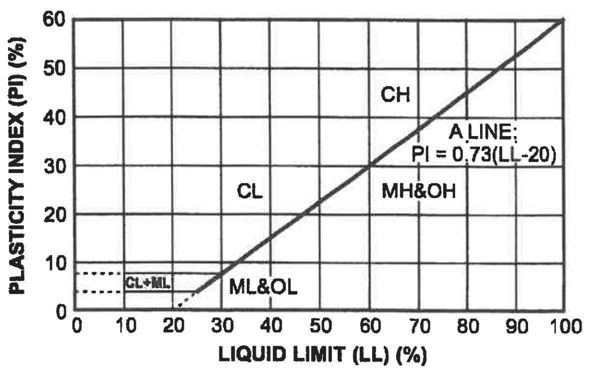
CONSISTENCY CLASSIFICATION

Description	Blows per Foot
Granular Soils	
Very Loose	< 5
Loose	5 – 15
Medium Dense	16 – 40
Dense	41 – 65
Very Dense	> 65
Cohesive Soils	
Very Soft	< 3
Soft	3 – 5
Firm	6 – 10
Stiff	11 – 20
Very Stiff	21 – 40
Hard	> 40

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.042
Fine-grained	No. 40 to No. 200	0.042 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

Project: Lime Plant (Cell 3)

Project No: 022-19002

Client: PVL Lime

Figure No.: A-1

Location: Ace Ash Landfill, Trona, California

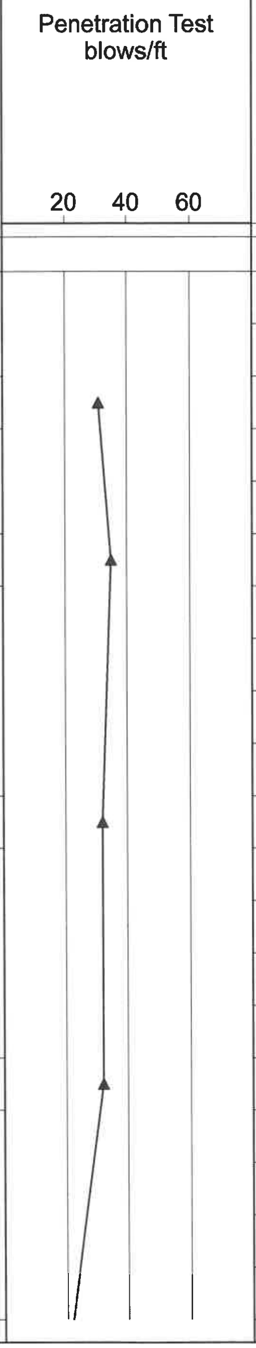
Logged By: R. Alexander

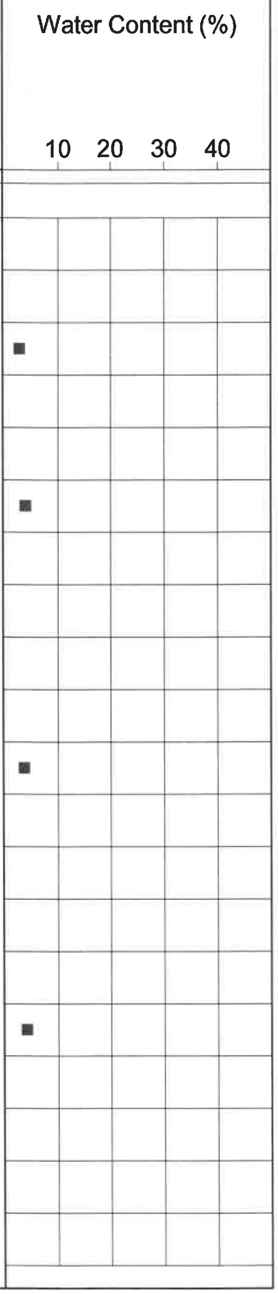
Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0	▨	***SILTY SAND (SM)*** FILL, fine- to medium-grained; light brown, damp, drills easily				
2	▨		113.0	3.1	■	31
4	▨	***GRAVELLY SILTY SAND (SM)*** FILL, fine- to coarse-grained; light brown, damp, drills easily				
	▨		118.3	4.2	■	35
6	▨					
8	▨					
10	▨		114.4	3.9	■	32
12	▨					
14	▨					
	▨		114.7	4.3	■	32
16	▨					
18	▨					
20	▨				■	





Drill Method: Hollow Stem

Drill Date: 1-30-19

Drill Rig: CME 45B

Krazan and Associates

Hole Size: 6½ Inches

Driller: Brent Snyder

Elevation: 31 Feet

Sheet: 1 of 2

DRAFT

Log of Boring B1

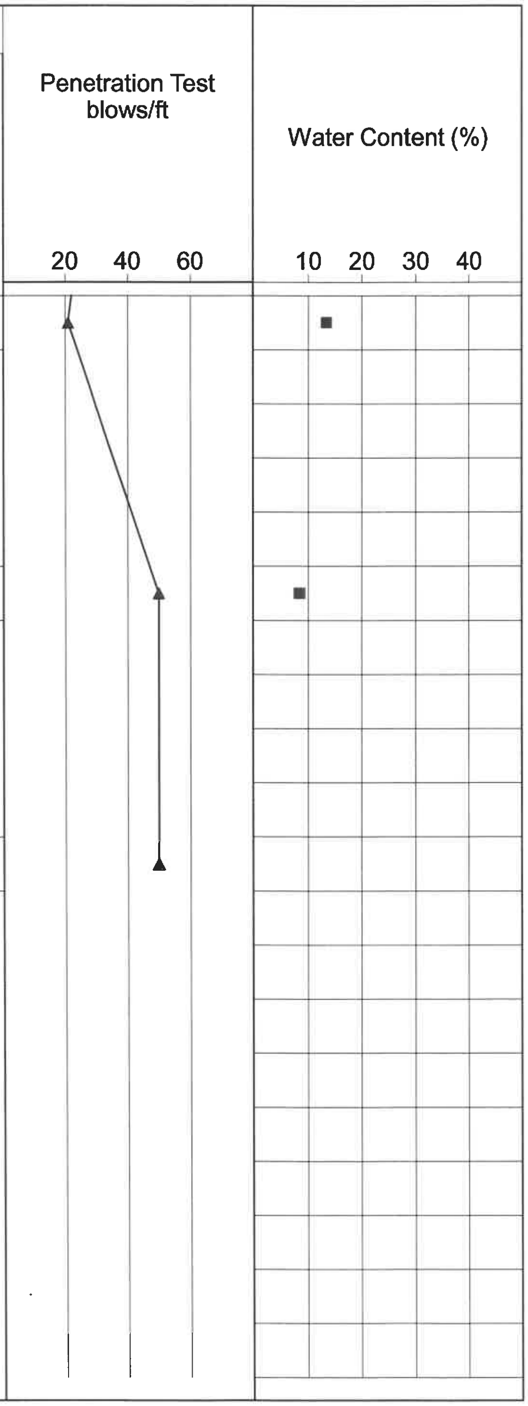
Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-1

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	▨		108.2	13.4	■	21
22	▨					
	■	***FLY ASH SLURRY*** FILL, fine- to coarse-grained; grayish-brown, damp, drills hard				
24	■					
	■		116.6	8.5	■	50+
26	■					
28	■					
30	■					
	■				■	50+
		End of Borehole				
32						
34						
36						
38						
40						



Drill Method: Hollow Stem
Drill Date: 1-30-19

Drill Rig: CME 45B
Hole Size: 6½ Inches

Krazan and Associates

Driller: Brent Snyder
Elevation: 31 Feet

Sheet: 2 of 2

DRAFT

Log of Boring B2

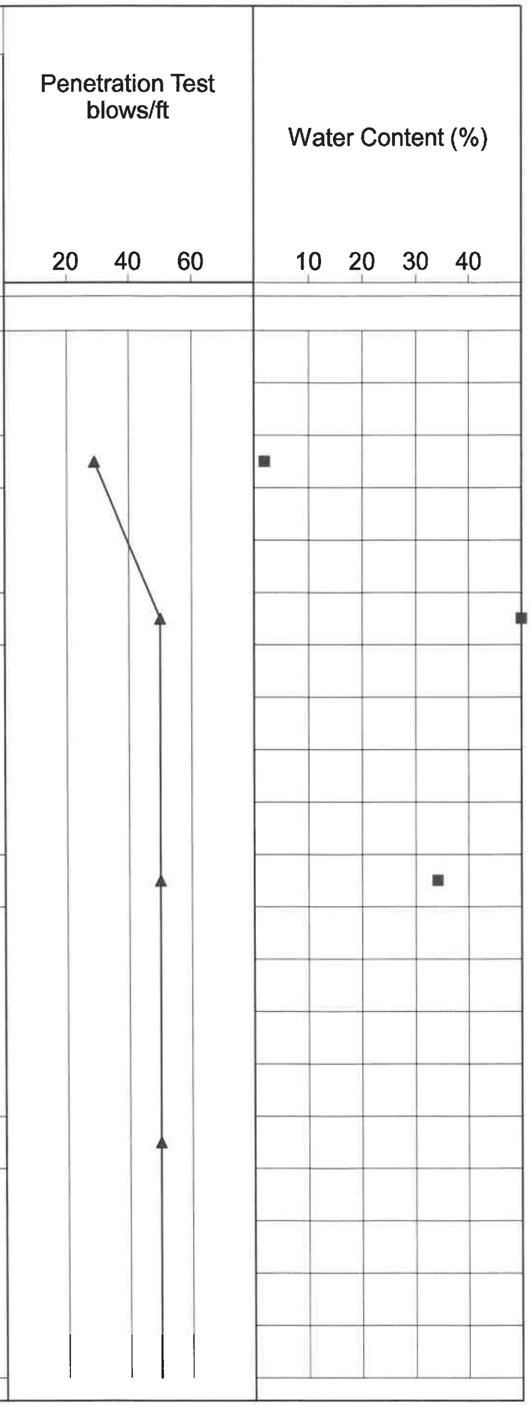
Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-2

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0	▨	***GRAVELLY SILTY SAND (SM)*** FILL, fine- to coarse-grained; brown, damp, drills easily				
			111.7	2.0	■	29
	●	***FLY ASH SLURRY*** FILL, fine- to medium-grained; dark brown, moist, drills hard	60.8	85.0	■	50+
			59.2	34.2	◩	50+
					◩	50+



Drill Method: Hollow Stem
Drill Date: 1-30-19

Drill Rig: CME 45B
Hole Size: 6½ Inches

Krazan and Associates

Driller: Brent Snyder
Elevation: 55 Feet

Sheet: 1 of 3

DRAFT

Log of Boring B2

Project: Lime Plant (Cell 3)

Project No: 022-19002

Client: PVL Lime

Figure No.: A-2

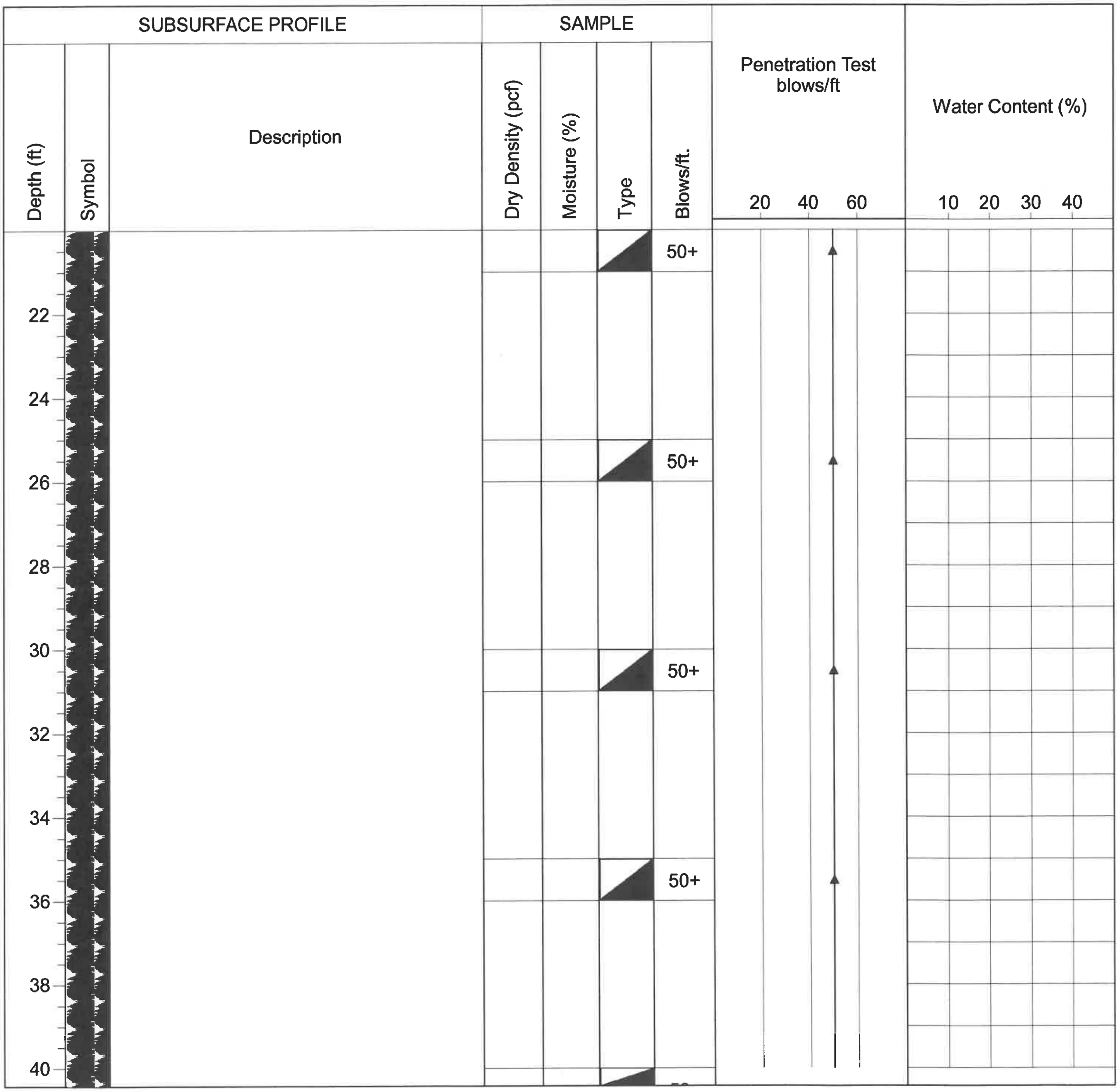
Location: Ace Ash Landfill, Trona, California

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None



Drill Method: Hollow Stem

Drill Date: 1-30-19

Drill Rig: CME 45B

Krazan and Associates

Hole Size: 6½ Inches

Driller: Brent Snyder

Elevation: 55 Feet

Sheet: 2 of 3

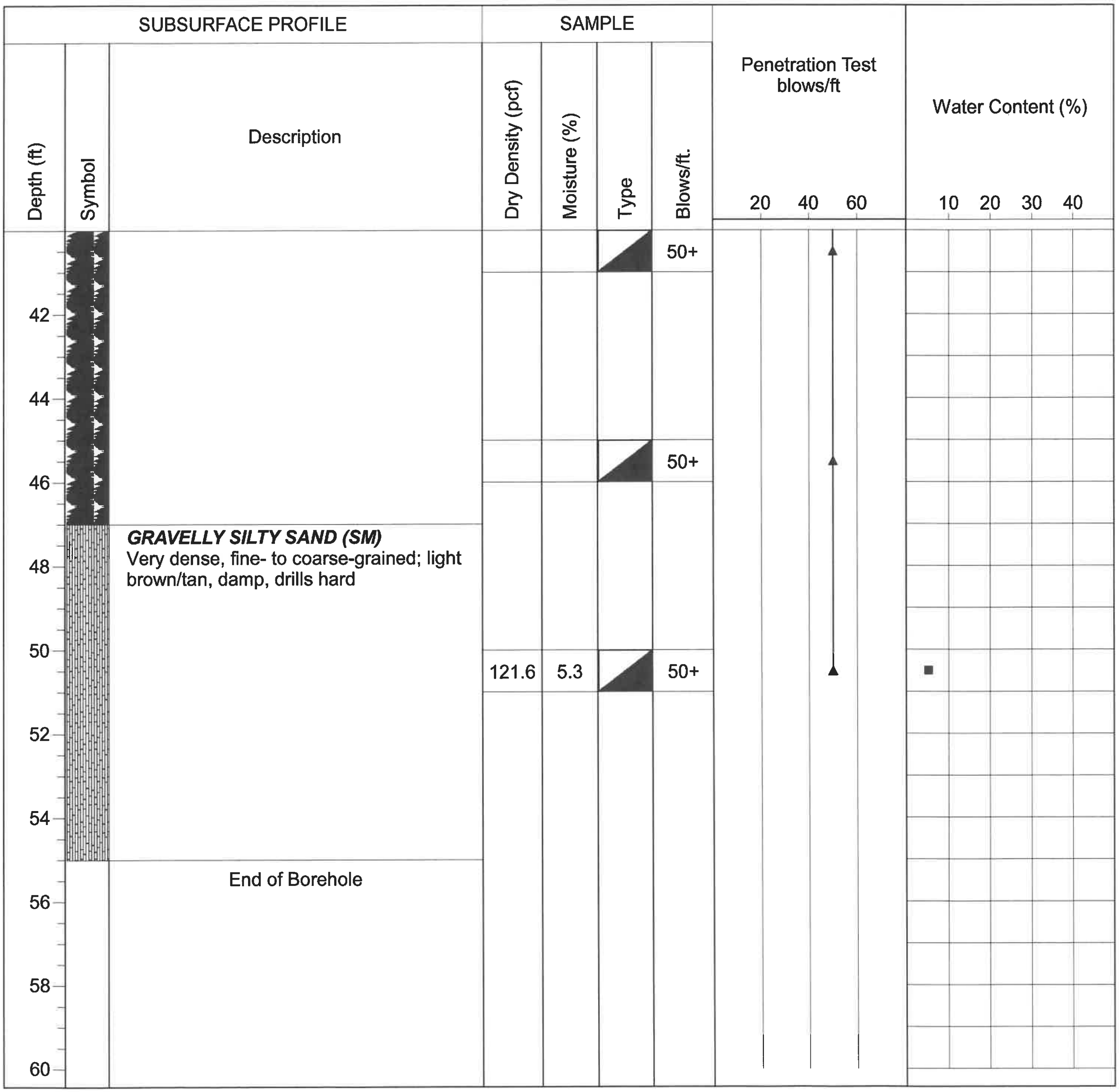
Log of Boring B2

Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-2

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water>
Initial: None
At Completion: None



GRAVELLY SILTY SAND (SM)
Very dense, fine- to coarse-grained; light brown/tan, damp, drills hard

End of Borehole

Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		◢	50+
		◢	50+
121.6	5.3	◢	50+

Drill Method: Hollow Stem
Drill Date: 1-30-19

Drill Rig: CME 45B
Krazan and Associates
Hole Size: 6½ Inches

Driller: Brent Snyder
Elevation: 55 Feet

DRAFT

Log of Boring B3

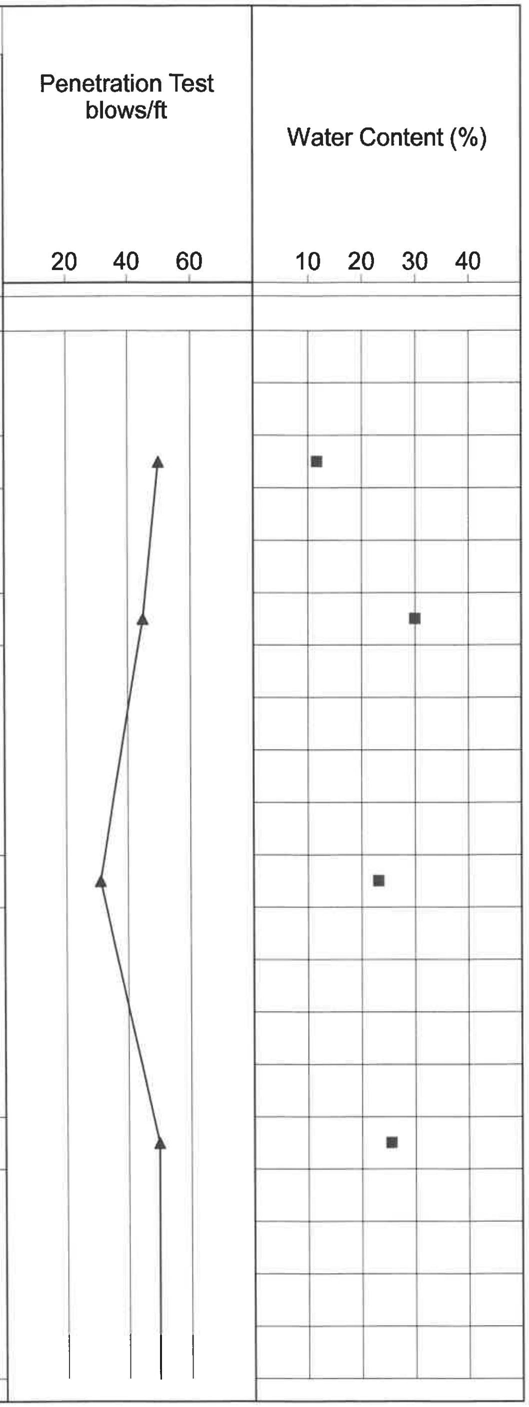
Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-3

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	Ground Surface				
0	***GRAVELLY SILTY SAND (SM)*** FILL, fine- to medium-grained; light brown, damp, drills firmly				
2	***FLY ASH SLURRY*** FILL, fine- to medium-grained; light gray, damp, drills firmly	104.4	11.7	■	50+
4	***FLY ASH*** FILL, fine- to medium-grained; dark brown, damp, drills hard				
			30.0	◩	45
10		75.9	23.2	◩	31
14		85.9	25.5	■	50+
20				◩	



Drill Method: Hollow Stem
Drill Rig: CME 45B
Driller: Brent Snyder

Krazan and Associates

Drill Date: 1-30-19
Hole Size: 6½ Inches
Elevation: 35 Feet
Sheet: 1 of 2

DRAFT

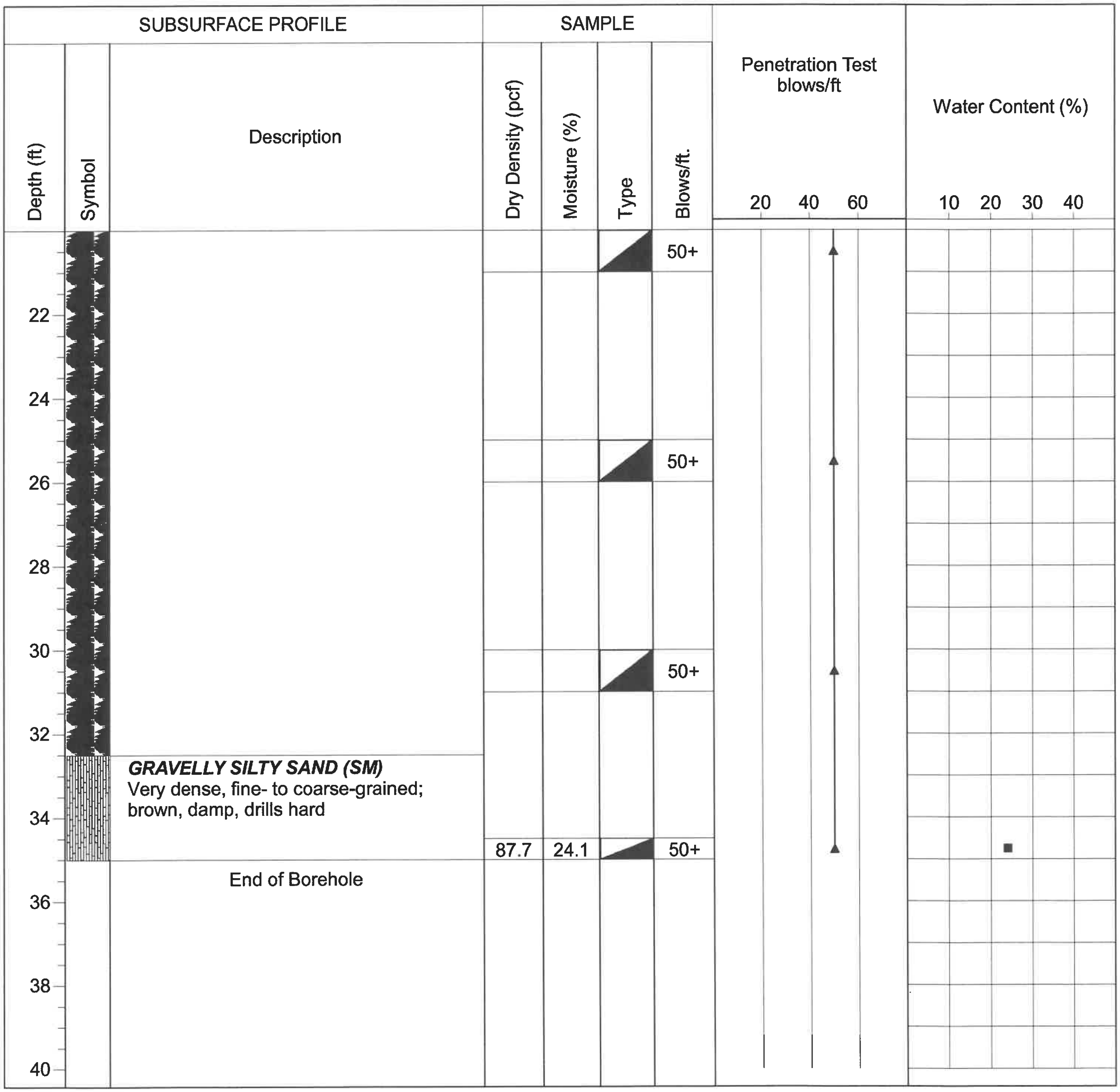
Log of Boring B3

Project: Lime Plant (Cell 3) **Project No:** 022-19002

Client: PVL Lime **Figure No.:** A-3

Location: Ace Ash Landfill, Trona, California **Logged By:** R. Alexander

Depth to Water> **Initial:** None **At Completion:** None



Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
			◢	50+
			◢	50+
			◢	50+
GRAVELLY SILTY SAND (SM) Very dense, fine- to coarse-grained; brown, damp, drills hard	87.7	24.1	◢	50+
End of Borehole				

Drill Method: Hollow Stem **Drill Date:** 1-30-19

Drill Rig: CME 45B **Krazan and Associates** **Hole Size:** 6½ Inches

Driller: Brent Snyder **Elevation:** 35 Feet

Sheet: 2 of 2

Log of Boring B4

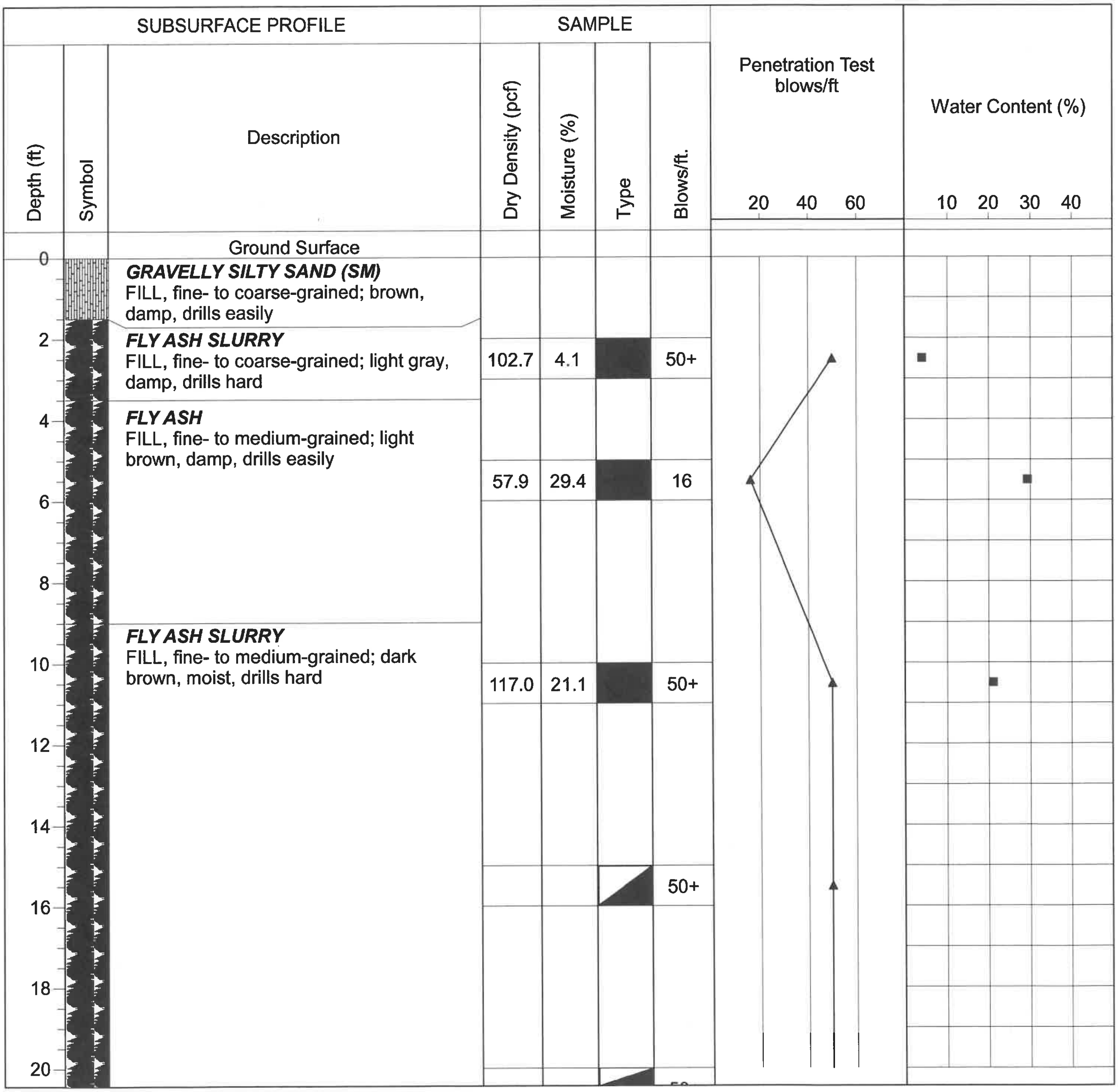
DRAFT

Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-4

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water> **Initial:** None **At Completion:** None



Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Blows/ft.
0	Ground Surface			
0	***GRAVELLY SILTY SAND (SM)*** FILL, fine- to coarse-grained; brown, damp, drills easily			
2	***FLY ASH SLURRY*** FILL, fine- to coarse-grained; light gray, damp, drills hard	102.7	4.1	50+
4	***FLY ASH*** FILL, fine- to medium-grained; light brown, damp, drills easily	57.9	29.4	16
9.5	***FLY ASH SLURRY*** FILL, fine- to medium-grained; dark brown, moist, drills hard	117.0	21.1	50+
15.5				50+

Drill Method: Hollow Stem
Drill Date: 1-30-19

Drill Rig: CME 45B
Hole Size: 6½ Inches

Krazan and Associates

Driller: Brent Snyder
Elevation: 50 Feet

Sheet: 1 of 3

Log of Boring B4

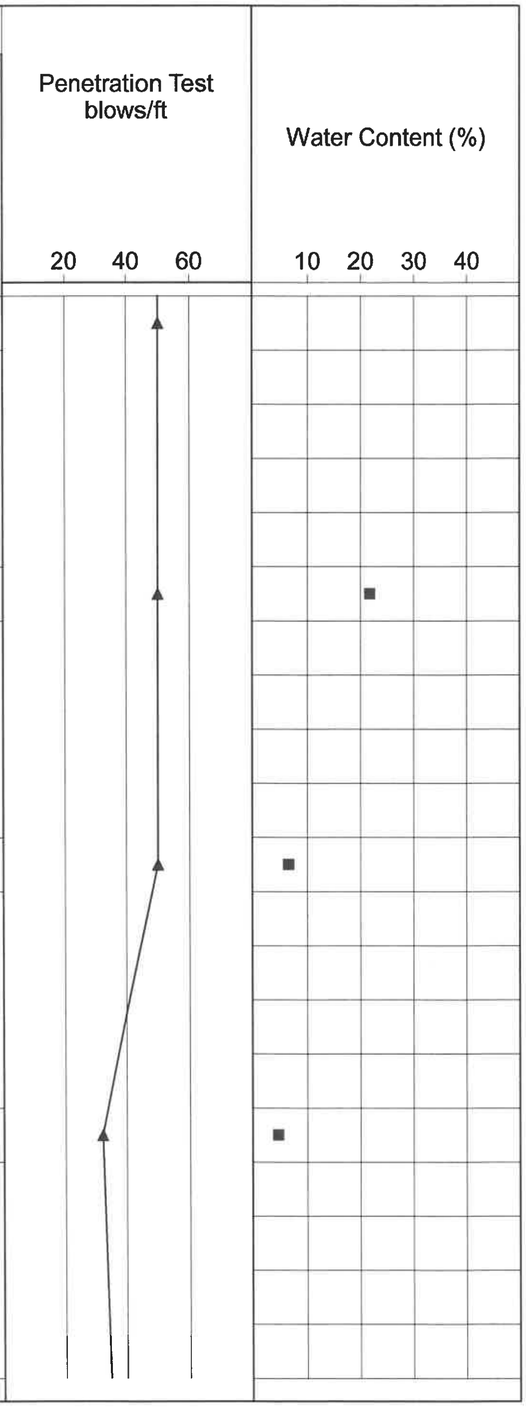
Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-4

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
20–22.5					◪	50+
22.5		***GRAVELLY SILTY SAND (SM)*** Very dense, fine- to coarse-grained; light brown/tan, damp, drills firmly				
25			104.1	21.8	■	50+
30			119.4	6.7	■	50+
35		Medium dense below 35 feet	105.8	4.5	■	32
40					■	



Drill Method: Hollow Stem
Drill Date: 1-30-19

Drill Rig: CME 45B
Krazan and Associates
Hole Size: 6½ Inches

Driller: Brent Snyder
Elevation: 50 Feet

DRAFT

Log of Boring B4

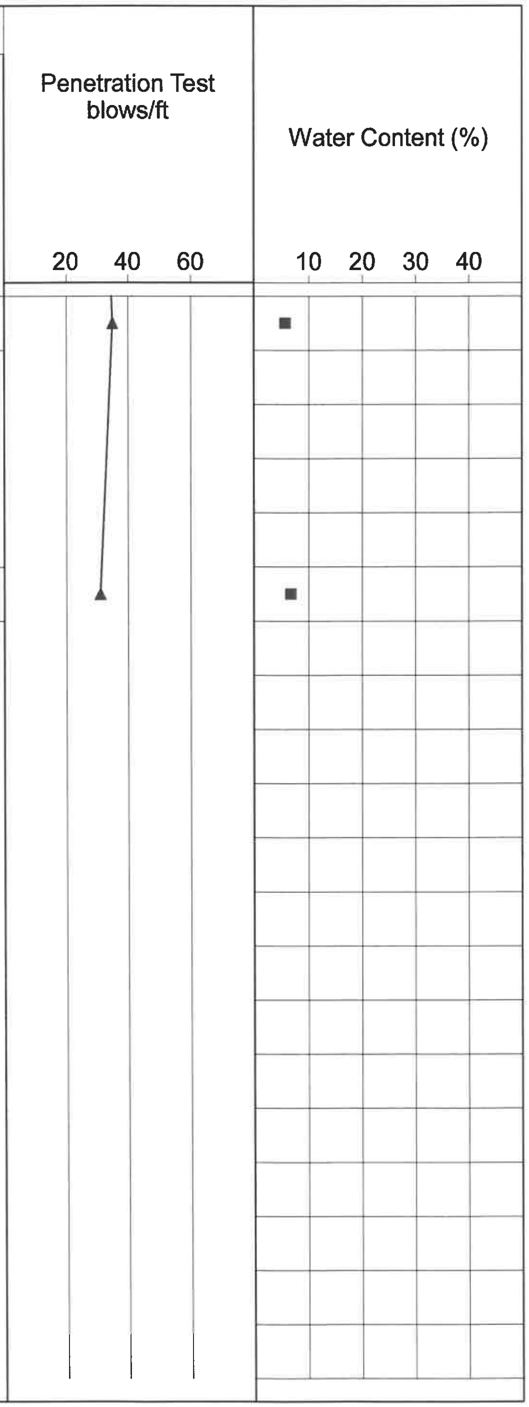
Project: Lime Plant (Cell 3) **Project No:** 022-19002

Client: PVL Lime **Figure No.:** A-4

Location: Ace Ash Landfill, Trona, California **Logged By:** R. Alexander

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	▨		112.3	5.8	■	35
42	▨					
44	▨					
	▨		113.9	6.8	■	31
46	▨					
48	▨					
50		End of Borehole				
52						
54						
56						
58						
60						



Drill Method: Hollow Stem **Drill Date:** 1-30-19

Drill Rig: CME 45B **Krazan and Associates** **Hole Size:** 6½ Inches

Driller: Brent Snyder **Elevation:** 50 Feet

Sheet: 3 of 3

DRAFT

Log of Boring B5

Project: Lime Plant (Cell 3)
Project No: 022-19002

Client: PVL Lime
Figure No.: A-5

Location: Ace Ash Landfill, Trona, California
Logged By: R. Alexander

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE					
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	Penetration Test blows/ft 20 40 60	Water Content (%) 10 20 30 40
		Ground Surface						
0		***GRAVELLY SILTY SAND (SM)*** Loose, fine- to coarse-grained; light brown, damp, drills easily Medium dense below 2 feet						
2								
4								
6								
8								
10								
12								
14								
		End of Borehole						
16								
18								
20								

Drill Method: Solid Flight
Drill Date: 1-30-19

Drill Rig: CME 45B
Krazan and Associates
Hole Size: 4½ Inches

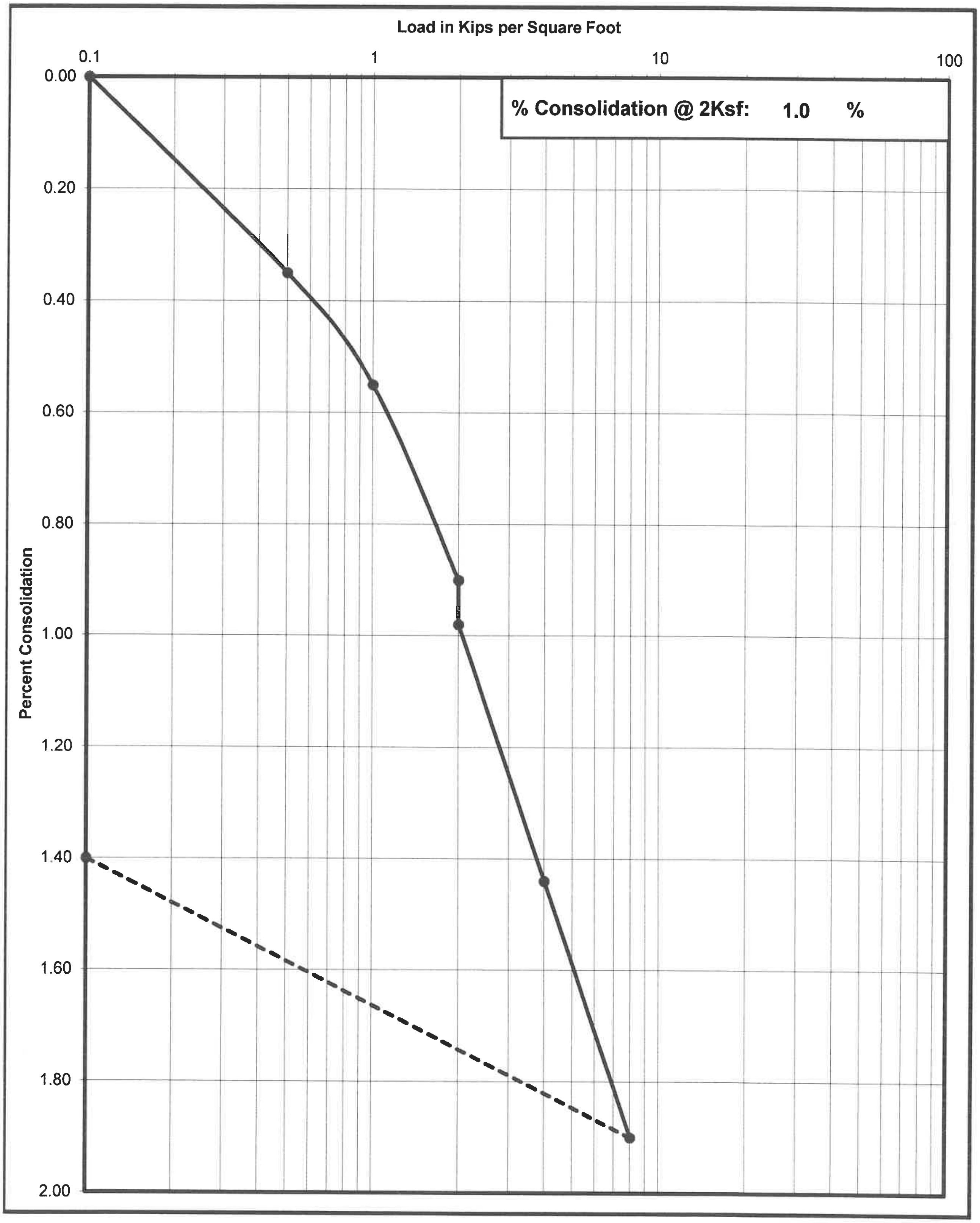
Driller: Brent Snyder
Elevation: 15 Feet

Sheet: 1 of 1

DRAFT

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
022-19002	B1 @ 20-21'	2/15/2019	SM

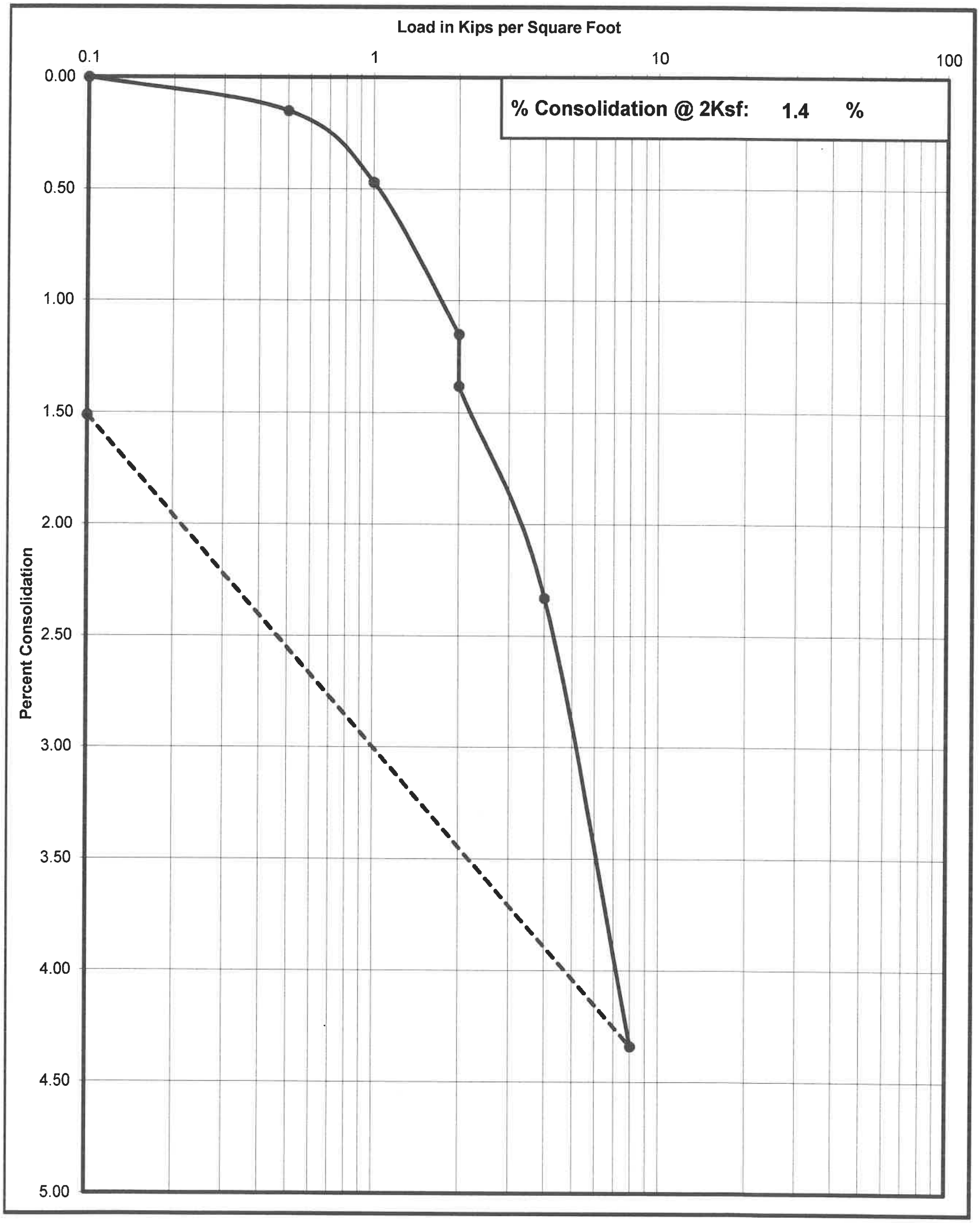


Krazan Testing Laboratory

DRAFT

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
022-19002	B9 @ 5-6'	2/15/2019	SM/ML (Fly Ash)



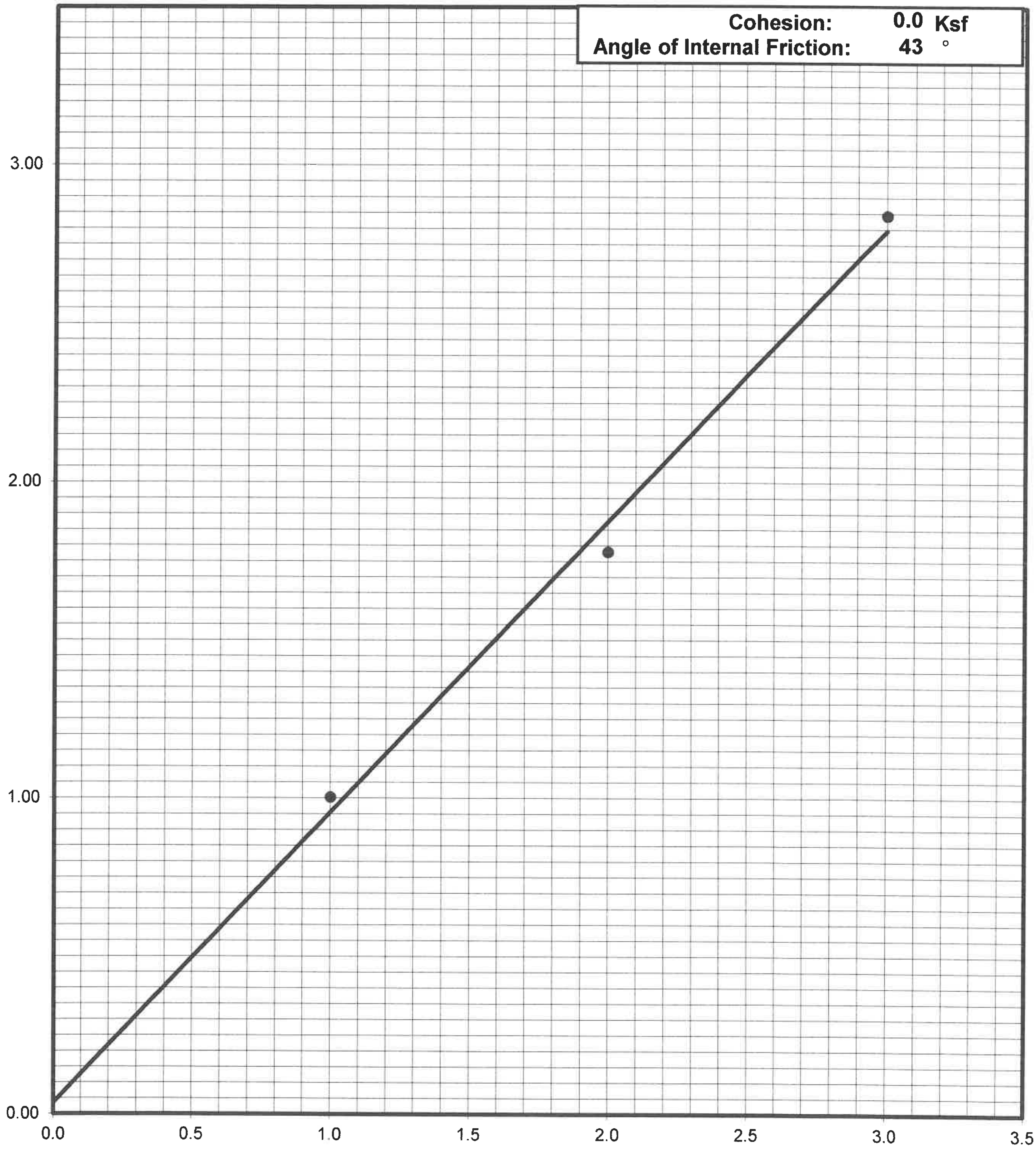
Krazan Testing Laboratory

DRAFT

Shear Strength Diagram (Direct Shear)

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
022-19002	B1 @ 5-6'	SM	2/15/2019

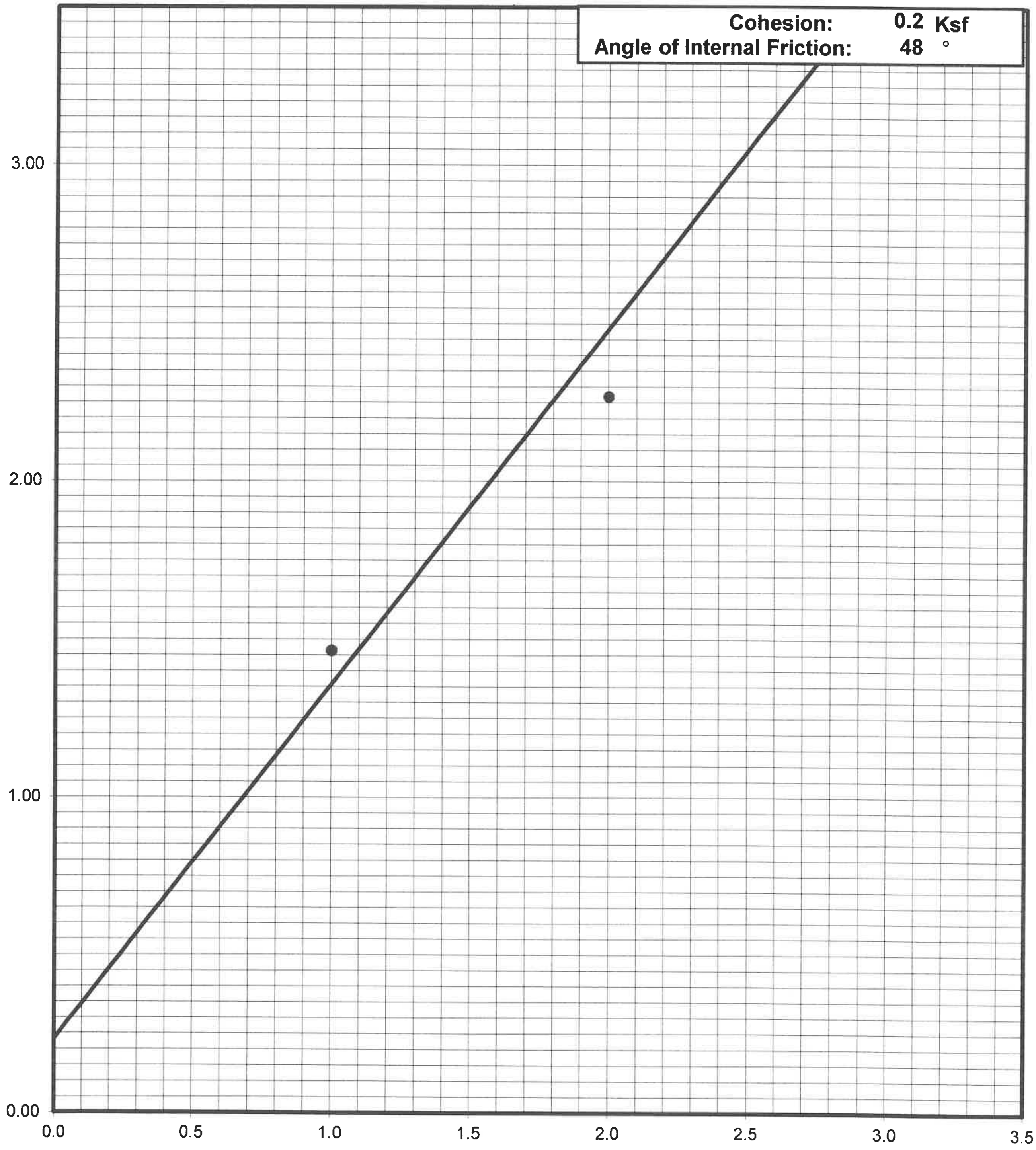


Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
022-19002	B2 @ 5-6'	ML cemented (Fly Ash)	2/15/2019



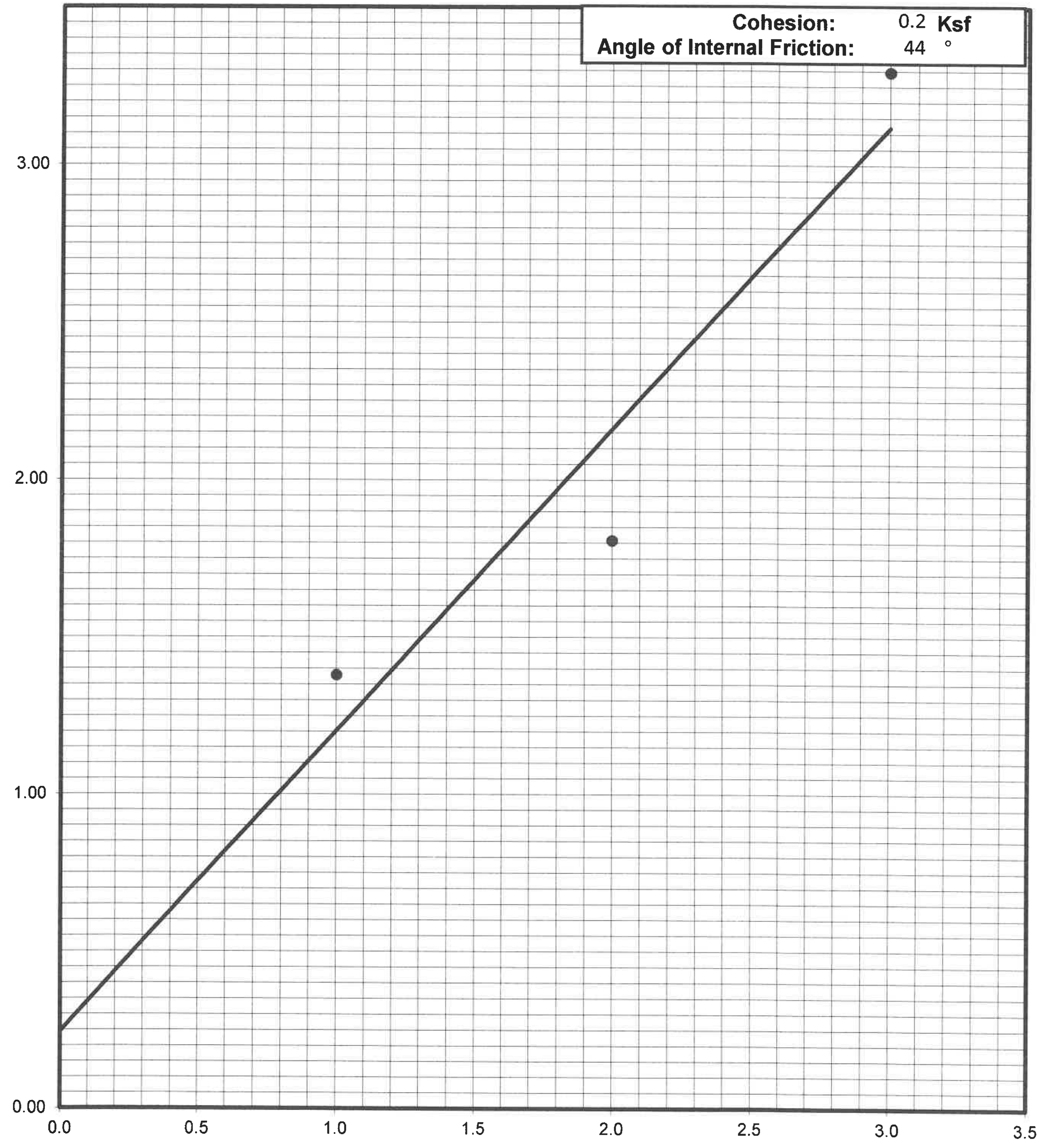
Krazan Testing Laboratory

DRAFT

Shear Strength Diagram (Direct Shear)

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
022-19002	B4 @ 10-11'	ML cemented (Fly Ash)	2/15/2019



Krazan Testing Laboratory